

CATALOGUE

18

OF THE

TRUSTEES, OFFICERS, AND STUDENTS

OF THE

UNIVERSITY OF PENNSYLVANIA.

1873-74.



PHILADELPHIA:
COLLINS, PRINTER, 705 JAYNE STREET.
1873.

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Assistant Professor of Civil Engineering. 121 S. 34th Street.

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Assistant in Analytical and Applied Chemistry and Mineralogy.
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Assistant in Analytical and Applied Chemistry and Mineralogy.
1407 Locust Street.

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- MISS J. BEDLOCK,
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- MISS M. WALLACE and Miss M. BEDLOCK,
Teachers in Charity Schools.

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SENIORS, 15

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JUNIORS, 19

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LAWRENCE LEWIS,	do.	do.
JOHN MORTON MCCLELLAN,	do.	do.
JOHN JAY JOYCE MOORE,	do.	do.
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JOSEPH MILLER THOMAS,	do.	do.
		FRESHMEN, 31.

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		PARTIAL STUDENTS, 11.

DEPARTMENT OF ARTS.

RECAPITULATION.

SENIORS	12
JUNIORS	19
SOPHOMORES	13
FRESHMEN	31
TOTAL	<u>75</u>
SCIENTIFIC STUDENTS IN THE DEPARTMENT OF ARTS	3
PARTIAL COURSES	11
TOTAL MATRICULATES IN THE DEPARTMENT OF ARTS,	<u>89</u>

DEPARTMENT OF SCIENCE.

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HENRY COENHOVEN BOYER,	do.	Norristown.
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JOSEPH ELEUTERIO HATTON,	do.	Philadelphia.
LUCIEN EUGENE ROSAMOND LYONS,	do.	do.
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GEORGE SMEDLEY WEBSTER,	do.	do.
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JOHN HOWARD CAMPBELL,	Pennsylvania.	Philadelphia.
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EDWARD SMITH HANDY, JR.,	do.	do.
HARRY HUNTER SMITH HANDY,	do.	do.
EDWARD HAZELHURST,	do.	do.
JOSEPH NATHANIEL HOLMAN,	do.	do.
ALFRED PEARCE,	do.	do.
PEDRO GROTJAN SALOM,	do.	do.
HARRY CAVALIER SMITH,	do.	Andalusia.

DEPARTMENT OF SCIENCE.

RECAPITULATION.

POST-GRADUATE STUDENTS	5
SENIORS	7
JUNIORS	9
SOPHOMORES	39
FRESHMEN	39
SPECIAL AND PARTIAL COURSES	27
TOTAL	126

GENERAL STATEMENT.

Instruction is given in the UNIVERSITY OF PENNSYLVANIA in four different Departments, viz.:—

THE DEPARTMENT OF ARTS.

THE DEPARTMENT OF SCIENCE.

THE DEPARTMENT OF MEDICINE.

THE DEPARTMENT OF LAW.

BUILDING, APPARATUS, ETC.

The Trustees of the University have erected for the accommodation of the Departments of Arts and of Science, one of the largest and most conveniently arranged college buildings in the country. This building stands in a square of ground containing more than six acres, and is about two hundred and sixty feet front, by more than one hundred in depth. It was planned with special reference to the greatly increased number of rooms required for the full development of that elective system of studies which has now become the settled policy in the Department of Arts, as well as for the purpose of affording every facility for teaching Science in its applications to the Arts.

The students in these two Departments are under a common government and discipline, and are in constant association with each other. The instruction, however, in each Department is in charge of a distinct Faculty, and both the objects of that instruction and the methods of imparting it differ essentially.

By reference to the annexed diagrams, it will be seen that more than forty large rooms, admirably lighted and ventilated, have been provided for the accommodation of the students in these two Departments. The Faculties are now full; the best means of illustrating

their teaching have been provided; the Libraries have been greatly increased; Cabinets of Mineralogy, Geology, and of Mechanical Models have been added; and other and extensive improvements are in contemplation, with a view of enlarging the scope and promoting the efficiency of both Departments.

THE DEPARTMENT OF ARTS is designed mainly to give that comprehensive and liberal culture, and to secure that mental training and discipline which was until recent years the sole aim of the best known American colleges. The methods by which these objects are sought have been enlarged here by the adoption of a carefully arranged elective system, by the introduction of new subjects of study (notably the modern languages), and by giving greater prominence to certain old ones.

THE DEPARTMENT OF SCIENCE, while not neglecting the general liberal education of the student (as will be found hereafter more fully explained), aims chiefly to teach him the principles of natural and physical science with their applications to the arts of life.

THE DEPARTMENT OF MEDICINE.—The Trustees are erecting on Thirty-sixth Street, south of Locust, for the use of this Department, a Hall of very large dimensions, which is arranged for the convenient accommodation and instruction of students in accordance with plans based upon long experience here, and which will be supplied with all the approved means of research and investigation.

Adjoining this building a large Hospital is being erected by the Trustees, which will be placed in charge of the Medical Faculty. This Hospital will prove an invaluable means of clinical instruction.

It is expected that both the Medical Hall and the Hospital will be completed and ready for occupancy during the month of September, 1874.

THE DEPARTMENT OF LAW.—Measures are now under discussion for the reorganization of this Department with a view of enlarging its aims and rendering more systematic the instruction given by it.

DEPARTMENT OF ARTS.

I.

FACULTY.

CHARLES J. STILLÉ, LL.D., Provost, and Professor of History and English Literature.

REV. CHARLES P. KRAUTH, D.D., VICE-PROVOST, and Professor of Intellectual and Moral Philosophy.

GEORGE ALLEN, LL.D., Professor of the Greek Language and Literature.

FRANCIS A. JACKSON, A.M., Professor of the Latin Language and Literature.

E. OTIS KENDALL, LL.D., Professor of Mathematics.

OSWALD SEIDENSTICKER, Ph.D., Professor of the German Language and Literature.

JOHN G. R. McELROY, A.M., Adjunct Professor of Greek and History.

SAMUEL M. CLEVELAND, A.M., Professor of Rhetoric and Oratory.

REV. ROBERT E. THOMPSON, A.M., Assistant Professor of Mathematics.

PERSIFOR FRAZER, JR., A.M., Professor of Chemistry.

F. AMÉDÉE BRÉGY, A.M., Professor of the French Language and Literature.

GEORGE F. BARKER, M.D., Professor of Physics.

FRANCIS A. JACKSON, Secretary.

II.

TERMS OF ADMISSION.

To be admitted into the Freshman Class of the Department of Arts, a student must be at least fourteen years of age, and pass a satisfactory examination on the following subjects and authors:—

ENGLISH.—Ancient and Modern Geography (Labberton's Historical Atlas is recommended). English Grammar.

GREEK.—Greek Syntax and Prosody. *Xenophon* (Four Books of the Anabasis). *Homer* (First three Books of the Iliad).

LATIN.—Latin Syntax and Prosody (A practical familiarity with the scanning of Hexameters). *Cæsar* (Three Books of the Gallic War). *Virgil* (Six Books of the Æneid). *Cicero* (Four Orations against Catiline). *Horace* (First Book of the Odes).

MATHEMATICS.—Arithmetic, Elementary Rules of Algebra, including Simple Equations. Decimal System of Weights and Measures.

The students in the Department of Arts are distributed into four classes, viz.: the Senior, the Junior, the Sophomore, and the Freshman Classes.

The examinations of Candidates for admission will be held for the current year on Monday and Tuesday, June 22d, and 23d, at the hours and upon the subjects stated in the following schedule. Candidates must be punctual in their attendance at the hours named, and should also be present on Wednesday, June 24th, at one o'clock, to learn the result of their examinations.

ON MONDAY, JUNE 22D, from 9 o'clock to 11—A written examination in Arithmetic (especially—*The Simple Rules, Vulgar and Decimal Fractions*, and *The Extraction of the Square and Cube Root*): And in Algebra (*To Quadratic Equations*, as in Alsop's Algebra, to p. 152, including *Proportion, Progression, Surds, Imaginary Quantities*, and *The Binomial Theorem*).

From $11\frac{1}{4}$ to $12\frac{1}{4}$ —A written examination in *Greek Grammar*.

From $12\frac{1}{2}$ to 2—A written examination in *English Grammar* and in *Ancient and Modern Geography*.

ON TUESDAY, JUNE 23D, from 9 to 12—Oral examinations upon the following subjects and authors—

IN GREEK—Upon the *first four books of Xenophon's Anabasis* and the *first three books of the Iliad*.

IN LATIN—Translation, Syntax, and Prosody.

Applicants for admission to the SOPHOMORE OR JUNIOR CLASSES will, in addition to the above, be examined as follows:—

ON TUESDAY, JUNE 23D, from 9 to 12—Oral examinations on the following subjects and authors.

IN MATHEMATICS—On *Alsop's Algebra* (to the end of *Quadratic Equations*, pp. 1-183.—With especial reference to the *Definitions* and the *Solution of Quadratic Equations* by "*Completing the Square*"): And on the *first eight books of Davies' Legendre's Geometry*, excepting the *Second*, and not including the *Practical Applications* at the end of Books III. and IV.

IN FRENCH—On *Selections from Colloz's Pronouncing French Reader; Smith's Guide to French Conversation* (selections); and *Brégy's Compendium of Grammatical Rules* (First Part).

From 12 to $1\frac{1}{2}$ —Oral examinations—IN GREEK—Upon *Xenophon's Hellenics* (II. 4, IV. 2, 3, VI. 4, §§ 1-16, and VII. 5), and *The Clouds* of Aristophanes.

IN LATIN—Upon *Livy* (*Selections from the Tenth, Twenty-first, and Twenty-Second Books*. Horace, *Select Satires*; with the notes and explanations, as contained in the *Freshman Syllabus*).

IN HISTORY—Upon *Freeman's Outlines of History*, or *Weber's Outlines of Universal History*.

From $1\frac{1}{2}$ to $2\frac{1}{2}$ —A written examination on *The Rules of Latin Translation* and *The Rules of Syntax* to p. *xlili*.

Applicants for admission to the JUNIOR CLASS, who pass the above examinations satisfactorily, will have special appointments made for their examinations upon the studies of the *Sophomore Year*.

A second examination of applicants for admission will be held on days to be hereafter publicly announced previous to the beginning of the September Term.

As candidates are often found deficient in *Ancient and Modern Geography*, it may be well to remind them that the same examination in these subjects is required of them, whether they apply for admission to the Department of Arts or to that of Science. The examination will include in its questions, "*General Geography*" and, more minutely, that of *Modern Europe*, with particular reference to points of importance in the study of Modern History : and such portions of *Ancient Geography* as are necessary to the intelligent study of Ancient History : Particularly, the chief states, cities, rivers, mountain-chains, and adjacent waters and islands, of Asia Minor, Greece, and Italy.

All the students in the Department of Arts who are candidates for the degree of Bachelor of Arts, pursue the same studies during the Freshman and Sophomore years. For the remaining two years of the course a limited election or choice of various studies is permitted under the following rules :—

During these two years *all* the members of the class are *required* to study Intellectual and Moral Philosophy ; General Mechanics and Physics, including Physical Astronomy and Geography ; English Literature ; the elements of the History of Civilization, and of Social and Political Science. They are also all instructed in English Composition and in Oratory.

Besides these studies, each member of the class at the beginning of his Junior year must select from the following list *three* subjects of study which he shall pursue during the last two years of his course, the alternatives being the following. He must take either—

GREEK or GERMAN ;

LATIN or FRENCH ;

PURE MATHEMATICS or advanced studies in HISTORY and
ENGLISH LITERATURE.

A student may pursue the full course, or he may take any portion of that course which the Faculty may sanction. But no person will be admitted by the Faculty to a partial course, unless it is clearly shown that he has had sufficient preparation to profit by the instruction of those Professors whom he wishes to attend. At the termination of such a partial course, satisfactorily pursued, a certificate of proficiency will be awarded.

III.

COLLEGE TERMS AND VACATIONS—TUITION FEES.

The college year is divided into three terms: the *first* beginning on the 15th of September, and ending on the 24th of December; the *second* beginning on the 2d of January, and ending on the Wednesday before Easter; and the *third* beginning on the Tuesday after Easter, and ending on the last Thursday of June (Commencement day).

The Annual Tuition Fee is one hundred and fifty dollars, or fifty dollars for each term, payable always in advance, to the Treasurer of the University, at the beginning of each term.

During the first and second terms private examinations in the way of review are held by each Professor; and at the close of the third term a public examination upon the studies of the whole year is held by the Faculties in both Departments. At the end of each term students who attain distinction are classed in order of merit.

Students shown by their term average to be deficient in any of their studies are conditionally attached to their class until they prove on re-examination that said deficiency has been fully made up. In case of persistent neglect, or evident inability to keep up with the class, the student must be dropped from the rolls.

COURSE OF INSTRUCTION FOR THE DEGREE OF BACHELOR OF ARTS.

FRESHMAN CLASS.

- GREEK.—Xenophon (*Hellenics*). Aristophanes (*The Clouds*). Arnold's Greek Prose Composition.
- LATIN.—Selections from Livy and Horace's Satires, with Professor's Syllabus.
- MATHEMATICS.—Algebra (*Alsop*, to Chap. VII.). Geometry (*Legendre*, first eight books).
- ENGLISH.—*Freeman's Outlines of History* and Lectures, with *Labberton's Historical Atlas*. Compositions and Declamations.
- FRENCH.—*Collof's* Pronouncing French Reader. *Brégy's* Compendium of Grammatical Rules (First Part). Guide to French Conversation (*Smith*).

SOPHOMORE CLASS.

- GREEK.—Thucydides (*Sicilian Expedition*). Aristophanes. Arnold's Greek Prose Composition completed.
- LATIN.—Tacitus (*Agricola, Germania, or Histories*). Cicero (*De Senectute* or *De Officiis*). Horace (*Selected Odes*) with Professor's Syllabus of Horatian Metres.
- MATHEMATICS.—Algebra (*Alsop*), completed. Geometry completed (*Legendre*). Plane and Spherical Trigonometry (*Legendre*), with applications to Surveying, Navigation, etc. Conic Sections.
- ENGLISH.—Elements of Rhetoric. *Bain's Rhetoric*, with Lectures and Practical Exercises. *Earle's Philology of the English Tongue*, with Lectures. Composition and Declamations.
- GERMAN.—*Plute's* German Studies. Practical Exercises in Translation. Körner.
- FRENCH (*Voluntary*).—*Un Philosophe sous les toits*. Sue's Grammar. Guide to French Conversation (*Smith*).
- CHEMISTRY. Introduction to Modern Chemistry. Lectures.

JUNIOR CLASS.

- PHILOSOPHY (*Required*).—Intellectual Philosophy. Lectures introductory to Philosophy. *Hamilton's Philosophy*. Moral Philosophy. *Whewell's Elements* (Lectures).
- GREEK (*Elective with German*). Theocritus. Demosthenes (*Public Orations*). Plato. *Sophocles*.
- LATIN (*Elective with French*).—Selections from Juvenal. Cicero. (*De Officiis, De Finibus, or De Amicitia*). Horace (*Epistles*).
- PURE MATHEMATICS (*Elective with English*).—Analytical Geometry, including Conic Sections (*Church*). Differential Calculus (*Church*) commenced.
- PHYSICS (*Required*).—Mechanics. Sound. Heat. (*Ganot's Physics*.) Experimental Lectures.

- * ENGLISH (*Required*).—Compositions and Declamations. Logic. (*Atwater*.)
 ENGLISH (*Elective* with *Pure Mathematics*).—Roman History (*Student's Gibbon*). Historical Lectures.
 GERMAN (*Elective* with *Greek*).—Plate's German Studies. Whitney's German Grammar. Schiller's Maria Stuart. *Storms Immensee*. Lectures on the History of the German Language.
 FRENCH (*Elective* with *Latin*). *Racine*. Brégy's Compendium, Part 2d.

SENIOR CLASS.

- PHILOSOPHY (*Required*).—Intellectual Philosophy—Lectures: *Systems from Bacon to the present*. *Berkeley's Principles*, annotated. Evidences of Natural and Revealed Religion. *Butler's Analogy*.
 GREEK (*Elective* with *German*).—Xenophon (*Memorabilia*). Euripides.
 LATIN (*Elective* with *French*).—Cicero *Tusculanæ* or *Oratio pro Cluentio*. Horace (*Ars Poetica*) or Lucretius (Selections).
 PURE MATHEMATICS (*Elective* with *English*).—Differential Calculus completed. Integral Calculus (*Church*).
 PHYSICS (*Required*).—Light and Electricity, including Magnetism. (Lectures). Mathematical and Physical Astronomy (*Gummere* and Lectures), Physical Geography (Lectures).
 ENGLISH (*Required*).—*Guizot's* History of Civilization. *Taine's* English Literature. International Law (Lectures). Social Science (*Carey* and Lectures). Compositions and Original Declamations.
 ENGLISH (*Elective* with *Pure Mathematics*).—Lectures on Modern History. Lectures on the Relations of English History to English Literature.
 GERMAN (*Elective* with *Greek*).—Schiller's Poems; Goethe's Egmont. Exercises in German Grammar. Synonyms.
 FRENCH (*Elective* with *Latin*).—*Molière*. Lectures on French Literature.

GRATUITOUS INSTRUCTION, Etc.

The Committee on the Department of Arts may admit, for gratuitous instruction in this Department, such pupils, not exceeding fifteen at any one time, as shall, after application to the Provost, have been examined and approved by the Faculty, and reported by the Provost as worthy of admission.

Two Literary Societies, consisting of students and alumni of the Institution, are sanctioned by the Board of Trustees, and meet in the University, being under the general control and supervision of the Faculty.

The degree of Master of Arts may be conferred on the alumni of the University, Bachelors in the Arts of three years' standing, who apply for it. Bachelors of Science (of three years' standing) are entitled to the degree of Master of Science, on presenting to the Faculty a Thesis, which shall give satisfactory evidence that the author has continued to devote himself with success to the study of science.

A public Commencement for conferring degrees is held on the last Thursday of June.

LIBRARIES.

Great additions have been made to the Libraries of the University during the past year. It is proposed to enlarge them still further, as occasion may offer, and to make the fullest use of this means of supplementing the instructions of the Class-room. Besides the old Library of the University, and those Libraries which are designed for the use of students in Chemistry and Engineering, the COLWELL LIBRARY, composed of a very complete collection of books relating to Social and Political Science, has been arranged and is now ready for reference. During the past year the extensive and valuable Classical Library of Professor ALLEN has been presented to the University. A very choice collection of books, intended to illustrate the instruction in History and English Literature, has also been added; and, lastly, a Library selected with great care and

designed to aid in the study of the English language, and of the works of Shakspeare, has been procured. The Libraries of the two Literary Societies of the University are also open to the students.

PRIZES.

I. A stated annual appropriation is made by the Board of Trustees to enable the Faculty to offer *Prizes* for superiority in the performance of voluntary exercises, over and above the ordinary Course. The subjects are proposed by the several Professors early in the year; the award is made by the Faculty, and reported to the Board, before the month of June; and the names of those who have received prizes are published at the annual Commencement.

The prizes offered for the present year, under this regulation, are—

1. In the DEPARTMENT OF INTELLECTUAL AND MORAL PHILOSOPHY, a Prize of the value of \$20 for the best Essay, by a member of the Junior Class. Subject: "*Natural Realism.*"

2. In the DEPARTMENT OF GREEK LANGUAGE AND LITERATURE, a prize of the value of \$30 for the best examination upon the "*Oration of Demosthenes on the Crown,*" to be read with the Professor, by members of the Senior Class.

3. A prize of the value of \$20, for the best examination upon the "*Electra of Sophocles,*" to be read with the Adjunct Professor, by members of the Junior Class.

4. A prize of the value of \$10, for the best examination, by a member of the Freshman Class, upon *Greek Prose Composition with the Accents.*

5. In the DEPARTMENT OF HISTORY AND ENGLISH LITERATURE, a prize of the value of \$30 for the best English Essay, by a member of the Senior Class. Subject: "*The Light of the Dark Ages.*"

6. A prize of the value of \$20 for the best English Essay, by a member of the Junior Class. Subject: "*The General Results to Roman Civilization of the Invasion of the Barbarians.*"

7. A prize of \$15 for the best original Declamation by a member of the Sophomore Class.

8. A prize of \$10 for the best Declamation by a member of the Freshman Class.

II. To encourage the training in Greek and Latin Prose Composition in the Preparatory Schools, first and second prize has been established by the Faculty, under authority of the Board of Trustees, of the values of \$15 and \$10 respectively, to be awarded annually to the two Freshmen who upon entering College shall pass the best special examination in the *Elements of Latin Prose Composition*, provided said examinations reach a satisfactory standard of excellence: the examination to take place on or about the first day of October. The examination in 1873 will be upon the whole of Part I. of Arnold's Latin Prose Composition. Certificates of the fact will also be presented to *all* competitors whose examination reaches a satisfactory standard.

Two prizes of like amount for *Greek Prose Composition* will be awarded annually. The examination in the year 1873 will be upon the whole of Leighton's Greek Lessons.

III. A prize of \$20 has been established by the Board of Trustees, to be awarded to such member of the Scientific Classes, as shall, "*by his improvement in Drawing, and his general good conduct and application,*" be entitled to such honorary distinction.

IV. The "HENRY REED PRIZE," founded by the Alumni of the University in memory of the late Prof. Henry Reed, is annually awarded for the best *English Essay* by a member of the Senior Class, entitling the successful candidate to one year's interest on a certificate of loan issued by the City of Philadelphia in the sum of \$600, and also to an accompanying Diploma of Merit. The Essays must be handed in to the Provost, for transmission to the Board of Trustees, by the first of April. The subject for the present year is "*The National Poet as the National Historian.*"

V. The SOCIETY OF THE ALUMNI have founded the following prizes:—

1. A prize to be annually awarded to that member of the graduating class who shall present the best *Latin Essay*, entitling the successful candidate to one year's interest on a certificate of loan, issued by the

City of Philadelphia, in the sum of \$900. The Essays must be handed to the Provost, for transmission to a Committee of Examiners appointed by the Society, by the first day of May.

2. A prize to be annually awarded to a member of the Junior Class for the best *Original Declamation*, entitling the successful candidate to one year's interest on certificates of loan, issued by the City of Philadelphia, in the sum of \$300.

DEPARTMENT OF SCIENCE.

I.

FACULTY.

CHARLES J. STILLÉ, LL.D., PROVOST OF THE UNIVERSITY, *Professor of History and English Literature.*

J. PETER LESLEY, LL.D., DEAN OF THE FACULTY, *Professor of Geology and Mining.*

E. OTIS KENDALL, LL.D., *Professor of Mathematics.*

F. A. GENTH, A.M., Ph.D., *Professor of Analytical and Applied Chemistry and Mineralogy.*

LEONARD GEORGE FRANCK, C.E., *Professor of Civil and Mechanical Engineering.*

PERSIFOR FRAZER, JR., A.M., *Professor of Chemistry.*

GEORGE F. BARKER, M.D., *Professor of Physics.*

REV. ROBERT E. THOMPSON, A.M., *Professor of Mathematics and Librarian.*

JOHN G. R. McELROY, A.M., *Adjunct Professor of History.*

OSWALD SEIDENSTICKER, Ph.D., *Professor of the German Language and Literature.*

F. AMÉDÉE BRÉGY, A.M., *Professor of the French Language and Literature.*

SAMUEL M. CLEVELAND, A.M., *Professor of Rhetoric and Oratory.*

LEWIS M. HAUPT, *Assistant Professor of Civil Engineering.*

INSTRUCTORS.

THOMAS W. RICHARDS, *Instructor in Drawing.*

GEORGE A. KENIG, Ph.D., *Assistant in Analytical and Applied Chemistry and Mineralogy.*

THOMAS M. CHATARD, S.B., *Assistant in Analytical and Applied Chemistry and Mineralogy.*

R. E. THOMPSON, A.M., *Secretary.*

II.

AIMS OF THE DEPARTMENT OF SCIENCE.

THE design of the instruction in this Department is to give a thorough technical and professional training to those who propose to engage in the following, among other pursuits, viz., in CHEMISTRY,

with its manifold applications to the industrial arts; in MINERALOGY, GEOLOGY, and MINING; in METALLURGY and ASSAYING; in ENGINEERING, CIVIL, MECHANICAL, and MINING, and in MECHANICAL DRAWING and ARCHITECTURE.

In order that this professional course shall be complete and systematic, and rest upon a broad basis, so that the student at its close may not be a mere *specialist*, but a man of liberal education as well, it has been determined that the course shall be a comprehensive one, extending through four years. The first two years are devoted, not merely to a thorough training in the preparatory and elementary Mathematics, Physics, Chemistry, and methods of physical research generally, but a considerable portion of the time is given to instruction in certain English studies—History, Logic, English Composition, Rhetoric, and Oratory—as well as to the Modern Languages and to Mechanical and Free Hand Drawing.

At the close of these two years, the student is presumed to be prepared for studies of a strictly professional or technical character, and he then selects one of four parallel courses, in which instruction is given in this Department, and during the last two years his work is mainly confined to the studies of one or other of these courses, in accordance with the plans he may have formed in regard to his future profession.

The professional courses, from which a student may select, are at present—

- I. COURSE IN ANALYTICAL AND APPLIED CHEMISTRY AND MINERALOGY.
- II. COURSE IN GEOLOGY AND MINING.
- III. COURSE IN CIVIL ENGINEERING.
- IV. COURSE IN MECHANICAL ENGINEERING.

The Degree conferred by the University, on the satisfactory completion of any one of these professional courses, is that of BACHELOR OF SCIENCE. Rules for conferring other Degrees usual in Scientific Schools will be established hereafter.

III.


TERMS OF ADMISSION, FEES, ETC.

Candidates for admission to the Freshman Class, in the Department of Science, must be at least sixteen years of age, and must be prepared to pass an examination in Ancient and Modern Geography, in English Grammar, in Arithmetic, including the Decimal System of Weights and Measures, in Algebra through Quadratic Equations, and in the first four books of Geometry (either Davies' *Legendre* or Chauvenet).

All applicants for admission, whether to the FRESHMAN or to the HIGHER CLASSES, will be examined for the current year as follows:—

ON MONDAY, JUNE 22d, from 9 o'clock to 11--A written examination in Arithmetic (*Elementary Rules. Compound Numbers, Proportion, Percentage-Fractions*): and in Algebra (*through Quadratic Equations in Alsop's Algebra*).

From $11\frac{1}{4}$ to $12\frac{1}{4}$ --A written examination in Geometry (*through the four first books of Davies' Legendre or Chauvenet*).

From $12\frac{1}{2}$ to 2--A written examination in *English Grammar* and in *Ancient and Modern Geography*.  For details of this examination see page 35.

Applicants for admission to the SOPHOMORE or JUNIOR CLASSES will, in addition to the above, be examined as follows:—

ON TUESDAY, JUNE 23d, from 9 to 12--A written or oral examination upon the whole of *Alsop's Algebra*, *Chauvenet's Geometry*, including the modern portion, on *Vogdes' Mensuration*, and *Church's Descriptive Geometry to the foot of p. 32*.

From 12 to $2\frac{1}{2}$ --Oral examinations upon the following subjects:--

IN HISTORY--Upon *Freeman's Outlines of History*, or *Weber's Outlines of Universal History*.

IN CHEMISTRY--Upon *Introduction to Modern Chemistry* (Hofmann).

IN FRENCH--On *Selections from Collot's Pronouncing French Reader*; *Smith's Guide to French Conversation* (pp. 7, 8, 182, 183, 184, 185); and *Brégy's Compendium of Grammatical Rules* (First Part).

Applicants for admission to the JUNIOR CLASS, who pass the above examinations satisfactorily, will have special appointments made for their examinations upon the studies of the *Sophomore Year*.

A second examination of candidates for admission will be held on

days to be hereafter publicly announced previous to the commencement of the term in September.

Special students (not candidates for a degree) may be received into any of the professional courses, when, in the opinion of the Professor, the applicant is likely to derive profit from the instruction given. Permission will not be given, however, in any case, except upon proof of sufficient preparation, and will be withdrawn in all cases of irregularity of attendance or conduct. To these students a **CERTIFICATE OF PROFICIENCY** will be awarded upon the completion of such a course and a satisfactory examination therein.

The college year is divided into three terms: the *first*, beginning on the 15th of September, and ending on the 24th of December; the *second*, beginning on the 2d of January, and ending on the Wednesday before Easter; and the *third*, beginning on the Tuesday after Easter, and ending on the last Thursday of June (Commencement day).

The fees for instruction in this Department are \$50 per term (payable in advance to the Treasurer at the beginning of each term), or \$150 per annum.

A separate charge is made to students of the Senior and Junior years, for chemicals and the use of apparatus.

Any further information concerning the Department of Science may be obtained by addressing Professor J. P. LESLEY, Dean of the Faculty, 1008 Clinton Street.

IV.

COURSE, METHODS, AND MEANS OF STUDY.

The Students in the Scientific Department are divided into four classes, Senior, Junior, Sophomore, and Freshman.

Instruction is given by lectures and recitations, and by daily exercises in the Laboratories and Drawing Rooms, which are open to the students all day, work being required of them five afternoons in the week, as well as in the morning hours named in the Roster.

Instruction is made as practical as possible. Students in **CHEMISTRY**

are given thorough courses of blowpiping and determination of hand specimens, apart from the lectures on Systematic Mineralogy and Metallurgy; and preparations are making for the erection of model crushing machines and furnaces, of a size sufficient for the reduction of ores on a scale larger than that of ordinary laboratory work.

Students in GEOLOGY are trained in drawing rooms to plotting original field notes, contouring, making relief maps of mineral properties, constructing sections on an equal vertical and horizontal scale, converting thereby their maps into clay models, casting these in plaster, and coloring the solid models to show the structure of the country. Solid models of underground work are made to show the posture of veins and beds, and the connection of these with the surface. To these are added illustrative diagrams and pictures, calculations of quantity, and whatever else is needful for the writing of reports for professional service.

One or more excursions to the mines and furnaces of the State, for the purpose of practical instruction, are provided for in the Spring.

Students in CIVIL AND MECHANICAL ENGINEERING will be required to make drawings and models as an essential part of the course.

The drawing-room contains models of bridges in stone, iron, and wood, selected from America, England, France, and Germany, of roofs, and various other structures, and also a set of topographical drawings.

A workshop for modelling in plaster of Paris is now established, where the students execute, from their own plans, the cutting, dressing, and joining of stones for walls and arches.

Field practice in Surveying and Engineering, and the visiting of machine shops, factories, and public works in process of construction form an essential part of the instruction given. Saturday is usually set apart for that purpose.

The field practice in Civil Engineering is intended to instruct the students in the practical problems of Chain Surveying (Perpendiculars, Broken Lines, Areas, etc.); and the use of instruments in the location of Roads, Railroads, and in Topography.

To the more advanced students the practical determination of the problems of Geodetic Surveying, including Hydrography, and of the construction of private and public works, will be illustrated and taught by field practice.

The PHYSICAL COURSE in the Department of Arts extends over two years; that in the Department of Science, over three. During the first year the instruction is by means of text-book recitations, explanations and illustrations being introduced where necessary. During the second year the instruction is by lectures, with examinations at stated intervals. In the first year the course comprises Mass-Physics, including Acoustics, and the subject of Heat, in Molecular Physics. In the second, Molecular Physics, comprising Light and Electricity, is finished. For the present, courses of lectures on Physical Astronomy and Physical Geography are included in the instruction of the second year in this department. The third year of instruction in physics is given exclusively to the Senior Class of the Department of Science, and consists of practical work in the *Physical Laboratory*, for a given number of hours a day. It is intended to limit the course to Quantitative Methods in Physics; in other words, to put the student in practical possession of the best methods of accurately measuring quantities, whether these be the simpler quantities of mass-measurement, as volumes, densities, or motions, or the more subtle measurements of thermal, electrical, or luminous quantities.

In Pennsylvania, the chief seat of coal mining and iron smelting, and in Philadelphia, the most important focus of American manufactures, such practical instruction in Mining and Metallurgy, Civil Engineering, and Mechanical and Physical Science, not only is indispensable, but takes precedence of merely didactic and theoretical scientific tuition, such as was once accounted a sufficient supplement of a liberal education. The Students of this Department of the University, therefore, are not only taught to comprehend the principles, but to exercise themselves constantly in the technical labor demanded by a professional life before assuming its responsibilities in the world of business. Every year will enlarge the scope and add to the efficiency of the instruction organized on this practical basis.

CABINETS, APPARATUS, ETC.

The *Mineralogical Department* contains a large collection of minerals, embracing over 10,000 specimens, representing the most important forms and varieties of nearly every established species. It contains many unique specimens, and especially many pseudomorphous forms.

Of instruments it contains a fine Zentmayer's microscope, with Polarizer, etc., and Groth's improved instruments, viz., Goniometer for the exact measurement of angles of crystals, his Stauroscope for the optical examination of crystals, and his universal compound instrument for the exact determination of the optical bisectrix and the optical behavior of minerals at an elevated temperature.

It also contains a collection of slices or microscopical plates of all the important minerals and artificial crystals for the study of their optical properties, and

A collection of microscopic plates of thirty-seven typical rocks, and a machine for the production of microscopic plates, and a complete collection of the renowned "Siegen Models of Crystals," illustrating the formation of the more complicated from the simple forms.

For instruction in *Analytical Chemistry*, students are furnished with a working table, and each with a set of such reagents as are constantly required for their work.

The Laboratory for Volumetric Analyses is furnished with a complete set of graduated vessels for normal or standardized solutions, with burettes, pipettes, etc.; also a collection of hydrometers, alcoholometers, and similar instruments, representing the principal forms used in the arts.

The Laboratory for Gas Analysis contains a complete set of apparatus for such work, absorptiometer, etc.; also a machine for graduating endimeters.

For the determination of the value of saccharine substances, a Solcil-Ventzke's Saccharimeter has been acquired, and for the valua-

tion of illuminating gas, Bunsen's Photometric Apparatus. Collection of chemical products and salts.

The Metallurgical and Assay Laboratories, etc., are furnished with the requisite furnaces, also with numerous diagrams and models of wood, representing on a reduced scale many of the most important forms of furnaces and machinery, and a Spectroscope, especially constructed for observations of the spectra in the production of Bessemer steel.

There is also a collection of furnace products and ores from Freiberg, representing the whole metallurgical process.

A *Collection of American Fossils* (exclusive of the vertebrata) has been presented to the Geological Museum of the University, and will be systematically arranged during the ensuing year. It will exhibit in two parts, first, type specimens of all the known subdivisions of prezoic, palæozoic, mesozoic, and kainozoic rocks, with or without their fossils; and, secondly, types of all known genera and characteristic species of the fossils themselves. It has been constructed on this plan to exhibit the gradual change of the sedimentary formations in passing from one geographical district to another, and the effects of these changes upon the organic life-forms in the same age and in successive ages.

Suites of European fossils and collections of American coals and iron ores make the Museum useful in other ways. It is hoped that all the graduates of the Department will show their interest in the Museum by collecting for it valuable suites of minerals, metals, products of furnaces, and fossils wherever they may spend their professional lives.

Important additions have been made to the already excellently-arranged apartments heretofore assigned to the *Department of Physics*. The lecture-room has been provided with the conveniences which the recent rapid progress of Experimental Physics renders necessary, if a corresponding fulness of demonstration be attained. Besides water, gas, and steam, the lecture-table is supplied with a vacuum and an air-blast, with oxygen and hydrogen, and with electricity, all of which are constantly available. The photometer-room and the battery-room are in course of preparation, and a photo-

graphic-room is contemplated. A large room has been assigned as a workshop, and is to be fitted up with the necessary tools for the working of wood and metals, after the plan now becoming general in all our larger scientific institutions. The value of such a room, in teaching the student the use of tools and in enabling him to construct special apparatus, cannot easily be overestimated.

The apparatus used both for the purposes of lecture-demonstration and of practical laboratory work in the Department of Physics, is intended to be very complete. A large part of it was purchased in Europe the past summer, and is at present upon our shelves. It comprises acoustical apparatus from Kœnig, electrical measurement apparatus from Elliott, other electrical apparatus from Ruhmkorff, Borehardt, Alvergnyat, and Geissler; optical apparatus from Duboseq, Hofmann, Browning, and Ladd; and apparatus in mass-physics from Salleron. Among the larger pieces of apparatus may be mentioned a magneto-electric machine for the electric light, from M. Gramme, and a powerful electro-magnet from Mr. Wallace. Another year, it is expected, still greater additions will be made to the collection of apparatus, especially to that portion designed for the physical laboratories and the laboratories for special investigation.

In the Department of *Mechanical Engineering* the cabinet contains: couplings, trains of spur- and bevel-wheels, the worm and spur-wheel, the screw-propeller, a combination of the toggle-joint and screw, the differential screw, a tilt-, trip-, and forge-hammer, several dynamometers, a governor with throttle-valve, a set of fixed and movable and compound pulleys, an apparatus to determine the coefficient of friction, and models of various forms of steam engines, water-wheels, etc.

V.

COURSE OF STUDY.

The following is an outline of the Course of Study pursued in this Department:—

FRESHMAN YEAR.

ENGLISH.—*Freeman's* Outlines of History, and Lectures, with *Labberton's* Historical Atlas. Compositions and Declamations.

FRENCH.—*Collet's* Pronouncing French Reader. *Brégy's* Compendium of Grammatical Rules (First Part). Guide to French Conversation (*Smith*).

MATHEMATICS.—Algebra. Mensuration (*Vogdes*). Geometry. Descriptive Geometry (Problems including the Point, Right Line, and Plane).

DRAWING.—Geometrical and Isometrical Drawing, and Drawing from the Flat. Free Hand Sketching. Use of the Scale and Protractor. Water-colors. Graphical representations from Geometry. Ornamentation.

PHYSICAL SCIENCE.—Somatology. Elementary Chemistry (Chemical Formulæ and Equations. Quantivalence). Elements of Geology.

SOPHOMORE YEAR.

ENGLISH.—Elements of Rhetoric (*Bain's Rhetoric*), with Lectures and Practical Exercises. *Earle's* Philology of the English Tongue, with Lectures. Composition and Declamations.

GERMAN.—*Plate's* German Studies. Practical Exercises in Translation.

FRENCH.—“*Un Philosophe sous les toits.*” *Sue's* Grammar. Guide to French Conversation. (*Smith*.)

SPANISH (*Voluntary*).—*Ollendorf's* Spanish Method. *Tolon's* Spanish Reader.

MATHEMATICS.—Trigonometry, Plane and Spherical (*Chauvenet*), with Applications to Surveying (Plotting from Field Notes and Computing of Areas). Descriptive Geometry (Practical Problems). Conic Sections. Analytical Geometry (Point, Line, and Intersection of Planes). Differential Calculus.

DRAWING.—Isometric and Linear Perspective. Principles of Architecture. Ornamental Drawing. Landscape.

PHYSICAL SCIENCE.—Mechanics, Sound, Heat. Theoretical Mineralogy (Crystallography, and Classification of Minerals). Examination of Natural and Artificial Salts. Theoretical Inorganic Chemistry (Chemistry of the Non-Metals, Metals, and Organic Compounds, with Stoichiometric Calculations). Topographical Geology (Construction of Geological Maps and Sections, Plans of Mines, and Calculations of Place and Quantity).

JUNIOR YEAR.

STUDIES PURSUED BY THE WHOLE CLASS.

ENGLISH.—Logic (Atwater). Compositions and Declamations.

GERMAN.—Schiller's *Maria Stuart*. Storm's *Immense*. Whitney's Grammar and Exercises.

PHYSICAL SCIENCE.—Light and Electricity, including Magnetism. Physical Astronomy, Physical Geography.

1. *Studies pursued by the Chemical Section.*

Practical instruction in Chemical Manipulation, the use and construction of apparatus, and the detection of the more frequently occurring elements and the simpler compounds.

Qualitative Analysis by the blowpipe in connection with reactions in the humid way for the rapid determination of Minerals and Ores.—Introduction into Metallurgy. Pyrochemical properties of Minerals and their compounds. Metallurgical processes.

Instruction in the practical production of chemical salts, preparations, and simple substances in their greatest perfection and purity; and also according to the principles which govern their manufacture on a large scale.

Qualitative Analysis of more complex substances, with practice in determining the color and condition of products and in the determination of minerals.

Qualitative Analysis and detection of the more rare elements and organic constituents of bodies. Introduction to Quantitative Analysis. Use of the spectroscope in qualitative determinations.

Assaying of Ores. Metallurgical apparatus and its construction, with practical exercises and demonstrations on models and diagrams. Fuel. Ores.

Practical assaying of ores in the dry way. Descriptive Mineralogy, the species and varieties fully illustrated by characteristic specimens of minerals.

2. *Studies pursued by the Geological Section.*

The Coal and Iron Mines of the United States. Methods of Mining. Statistics. Uses. Markets, History, etc.

Copper, Lead, Silver, Gold, Salt, Petroleum, etc., in the United States, and elsewhere.

Mapping and modelling continued.

3. *Studies pursued by the Civil Engineering Sections.*

MATHEMATICS.—Differential Calculus and Conic Sections completed. Calculus. Descriptive Geometry (application to Ground Plans, Maps, etc.).

APPLIED MECHANICS.—Motion of a Material Point. Statics and Dynamics of Rigid Bodies.

SURVEYING.—Locating of Roads, Drains, etc., on Topographical Charts. Filling in with Plane Table.

ENGINEERING.—Masonry. Framing. Calculation of the Strength of Frame Work.

DRAWING.—Topographical Drawing. Roofs. Bridges.

4. *Studies pursued by the Mechanical Engineering Section.*

MATHEMATICS.—Integral Calculus. Differential Calculus and Conic Sections (*completed*). Descriptive Geometry (Applications to the Projections of Machines).

MECHANICS.—Laws of Motion. Statics and Dynamics of rigid Bodies. Definition of Elementary Machines. Work done by Machines. Apparatus to Measure the Mechanical Effect. Regulating Apparatus. Fly-wheel. Governors and Brakes. Friction.

Drawing of parts of Machines: Screw-bolts and nuts; riveting; gudgeons, pivots, axles, shafts, couplings, pillow-blocks, shafthangers; band, cord, and train-wheels; gearing; crank and connecting rod; walking beam; connection of pipes, valves, cylinders, pistons, stuffing boxes; hempen ropes, wire ropes, chains, tools, etc.

SENIOR CLASS.

STUDIES PURSUED BY THE WHOLE CLASS.

ENGLISH.—Compositions. Declamations. *Guizot's* History of Civilization.

History of English Literature. Social Science and International Law.

GERMAN.—Goethe's *Egmont*; Whitney's Grammar and Exercises.

PHYSICAL SCIENCE.—Practical Physics, Instruction in the Physical Laboratory.

1. *Studies pursued by the Chemical Section.*

Quantitative Gravimetric Analysis of the simple and complex salts and minerals.

Practice in the analysis of unknown bodies. Volumetric Analysis and preparation of normal solutions. Gas Analysis. Manufacture, graduation, and use of eudiometers. Photometric tests.

Determination of the constituents of cast-iron and steel. Practice in Agricultural Chemistry, and Analysis of Manures.

Determination of small amounts of impurities (adulteration and poison in food and drink). Analysis of water of mineral springs. Organic Analysis. Practice in production of Chemical preparations. Quantitative Blowpipe Analysis.

Special Metallurgy—Gold, Silver, Lead, Copper, Zinc, Cobalt, Nickel, etc. Metallurgy of Iron and Steel treated with special attention. Metallurgical practice. Construction of plans for metallurgical works, with estimate of cost.

Practical determination of minerals by their physical properties.

2. *Studies pursued by the Geological Section.*

Special Geology of the United States taken up in order of the Formations, with characteristic minerals and fossils.

The general Geology and Topography of the World, with regard also to the distribution of the metals and fuels.

History of Geology.

Writing of Professional Reports and their illustration by diagrams, maps, and pictures.

Field practice.

3. *Studies pursued by the Civil Engineering Section.*

ENGINEERING.—Calculation of the Strength of Roofs and Bridges. Foundations. Retaining Walls. Arches. Reetification of Rivers. Roads and Canals. Drainage. Construction of dams, jetties, dikes, and breakwaters. Improvement of harbors. Location of cities (Plans. Width and direction of streets).

MACHINERY.—Hand-machinery. Water-wheels. Steam-engines.

ASTRONOMY.

GEODESY.—Triangulation. Geodetic Surveying (Latitude and Longitude)

DRAWING.—Plans. Elevations. Sections.

4. *Studies pursued by the Mechanical Engineering Section.*

APPLIED MECHANICS.—Statics and Dynamics of Fluid Bodies.

MECHANISM.—Trains of Mechanism in general ; rolling contact, sliding contact, wrapping connectors, link-work.

MACHINERY.—Strength and proportions of machines, water-wheels, water-pressure engines, steam and its properties, steam-engines, air and gas engines, estimates and contracts.

DRAWING.—Construction of machines. Working drawings.

COLLEGE DISTINCTIONS AWARDED DURING THE YEAR 1872-73.

DEPARTMENT OF ARTS.

At the examination of the Senior Class for Degrees the following members of the class were ascertained to have reached the first class of distinctions :—

- | | |
|----------------------------|------------------------------------|
| 1. William Force Whitaker, | 3. Theodore Daniel Frederick Beck, |
| 2. William Boyd, Jr., | 4. Henry Carvill Lewis. |

At the Annual Examination, 1873, the following Students were found to have reached the first class of distinctions in their respective classes :—

JUNIORS.

SOPHOMORES.

- | | |
|--------------------------|-------------------|
| 1. William James Martin, | 2. Carroll Smyth. |
|--------------------------|-------------------|

FRESHMEN.

- | | |
|-------------------------------------|------------------------|
| 1. George Christian Frederick Haas, | 2. Lawrence Lewis, Jr. |
|-------------------------------------|------------------------|

PRIZES for voluntary exercises, over and above the regular course, were awarded as follows :—

In the Department of Intellectual and Moral Philosophy : In the Junior Class, for the best Essay on “*The Special Importance of Philosophical Study in our own Day*,” LOUIS FITZGERALD BENSON.

In the Department of Greek Language and Literature : In the Senior Class, for the best Examination in “*Demosthenes on the Crown*,” read with the Professor in addition to the regular course—equally to WILLIAM BOYD, JR., and WILLIAM FORCE WHITAKER.

In the Junior Class, for the best examination upon the “*Oration of Æschines on the Crown*,” read with the Adjunct Professor in addition to the regular course—to NALBRO’ FRAZIER ROBINSON.

In the Freshman Class, for the best Examination in “*Greek Prose Composition with the Accents*”—to GEORGE CHRISTIAN FREDERICK HAAS.

In the Department of History and English Literature : Senior Prize for the best Essay on “*The Manufacture of Iron as an Element in the History of Civilization*,” to THEOPHILUS BAKER STORK.

The Sophomore Prize for the best *Original Declamation*, to JOHN WILLIAM TOWNSEND.

The *Matriculate Greek Prize*, for the best examination by a member of the Freshman Class, immediately after his admission to College, upon the "*Elements of Greek Prose Composition*"—to GEORGE CHRISTIAN FREDERICK HAAS.

"The *Alumni Prize*," for the best Latin Essay by a member of the Graduating Class—to WILLIAM FORCE WHITAKER.

The Junior Prize, founded by the Society of the Alumni, for the best *Original Declamation*, to CHAUNCEY AUGUSTUS BOCKOVEN.

The "*Henry Reed Prize*," for the best English Essay by a member of the Graduating Class, on the subject "*The Comparative Influence of the Sword and the Pen*," to THEOPHILUS BAKER STORK.

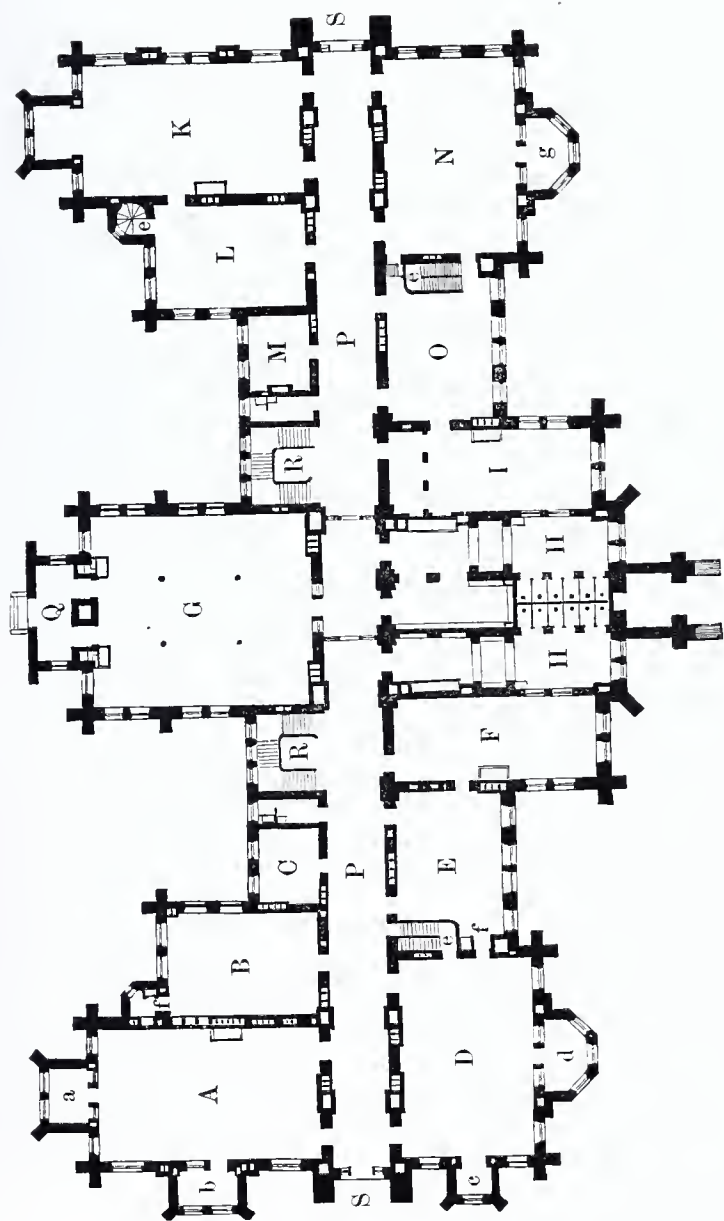
DEPARTMENT OF SCIENCE.

At the examination of the Senior Class for Degrees the following members of the class were ascertained to have reached the first class of distinctions:—

1. William Coleman Sellers.
2. Percival Holl Hickman.

At the annual examination, 1873, the following student was found to have attained the first distinction in the Sophomore Class.

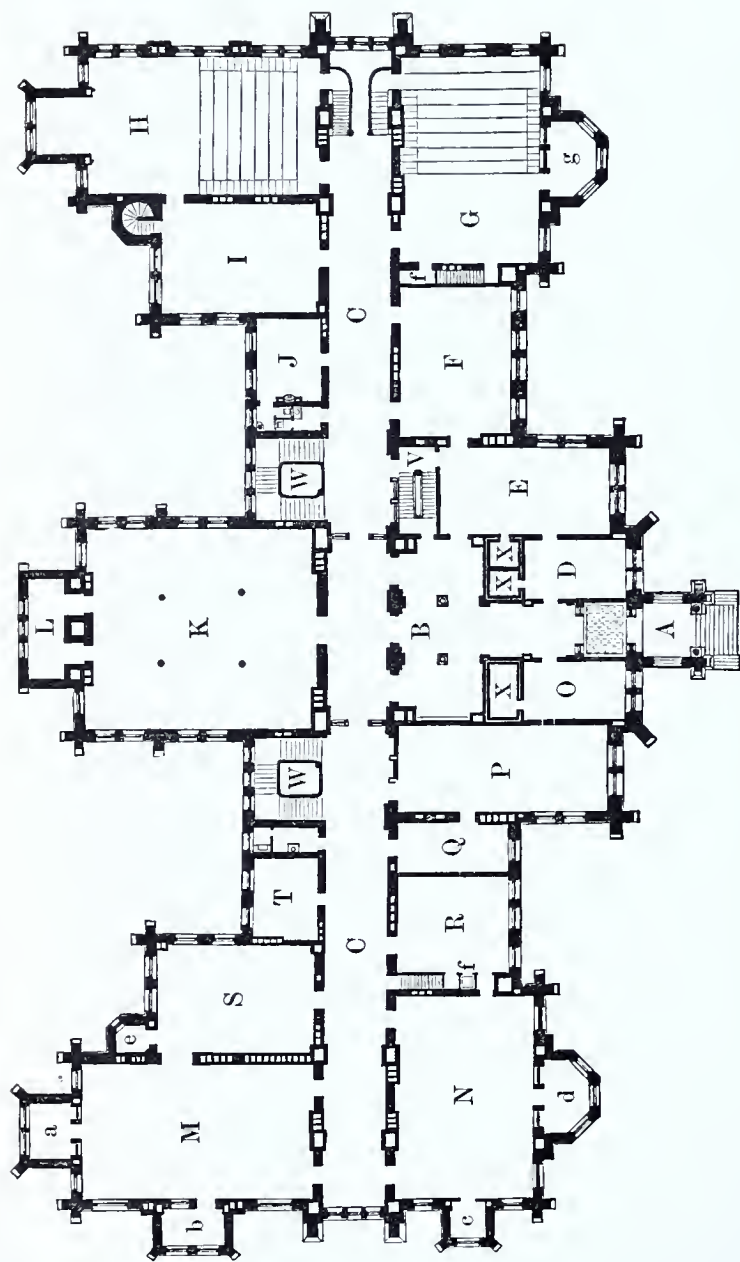
Henry Harrison Supplee.



PLAN OF BASEMENT.

- A.* Metallurgical Laboratory.
B. Furnace Room.
C. Balance Room.
D. Machinery and Work Room.
E. Store and Apparatus Room.
F. Janitor.
G. Assembly Room.
H. Water Closets.
I. Store Room.

- K.* Physical Laboratory.
L. Store Room—Department of Physics.
M. Janitor.
N. Preparing Laboratory—Chemistry.
O. Store Room—Department of do.
P. Corridor.
R. Main Stairway.
a, b, c, d, e, g. Assistants' Rooms.



PLAN OF FIRST FLOOR

A. Poreh.

B. Hall.

C. Corridor.

D. Office of the Secretary of the Board of Trustees.

E. Trustees and Faculty Room.

F. Provost's Lecture Room.

G. Chemical Lecture Room.

H. Lecture Room—Physics.

I. Apparatus Room—Physics.

J. Provost's Office.

K. Library.

L. Quantitative Laboratory.

M. Quantitative do.

N. Office of the Dean of the Faculty—Department of Science.

O. Professors' Private Laboratory.

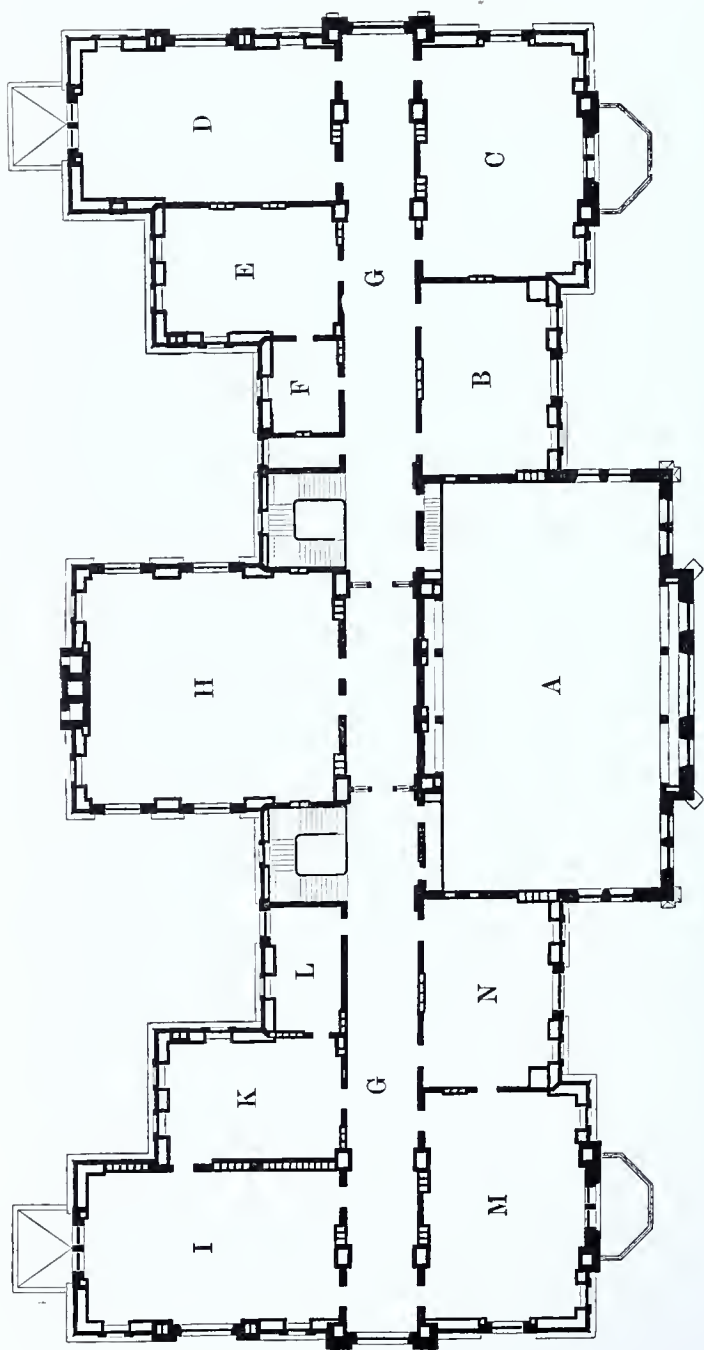
P. Balance Room.

Q. Room for Preparation of Chemicals.

R. Laboratory for Organic Analysis.

T. Balance Room.

a, b, c, d, g. Assistants' Rooms.



PLAN OF THIRD FLOOR.

- A. Upper Part of Chapel.
 B. Drawing Room.
 C. Professor of French.
 D. Assistant Professor of Mathematics.
 E. Professor of German.
 F. Private Room.
 G. Corridor.
 H. Examination Hall.
 I, K, L. Department of Mechanical and Civil Engineering.
 M, N. Work and Model Room do.
 O. Drawing and Architecture.

